1.0 INTRODUCTION

1.1 About this guide

This guide gives the information necessary for you to operate a Landmark Technic Signal Processor. Information regarding installation is contained within the Installation Guide. More detailed information regarding servicing, repair and calibration of the processor is contained in the Service Manual.

1.2 About the Landmark Technic Processor

The Landmark Technic Signal Processor provides an accurate signal processing unit for a single LAND System 4 thermometer. Features include:

- DIN rail mounting case
- Averager, Peak Picker and Track and Hold, for signal processing
- Remote input for Track and Hold, Control, Peak Picker Reset
- Emissivity/Non-greyness
- Alarm output
- Retransmission of the thermometer signal output.

Setting up of the processor is performed using a PC and configuration software (see Section 4).

1.3 Unpacking the processor

The package containing the processor will contain the following items:

- Envelope containing this User Guide
- Installation Guide
- A Landmark Technic Signal Processor
- Configuration software on CD and cable

1.4 Nomenclature

The processor is identified as the Landmark Technic (LM Technic) signal processor.

Landmark Technic User Guide

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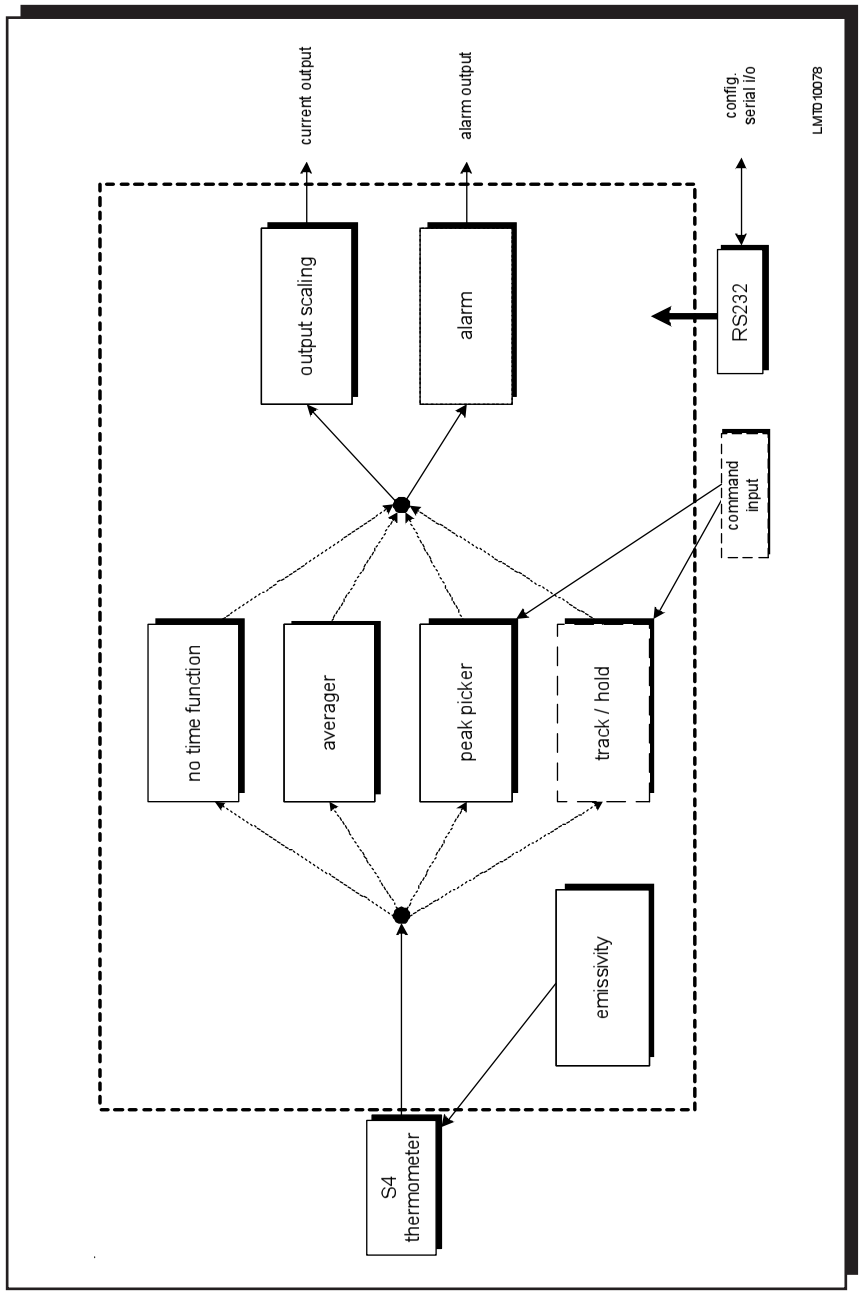

Fig. 2 LM Technic - Functional Block Diagram

User Guide Landmark Technic

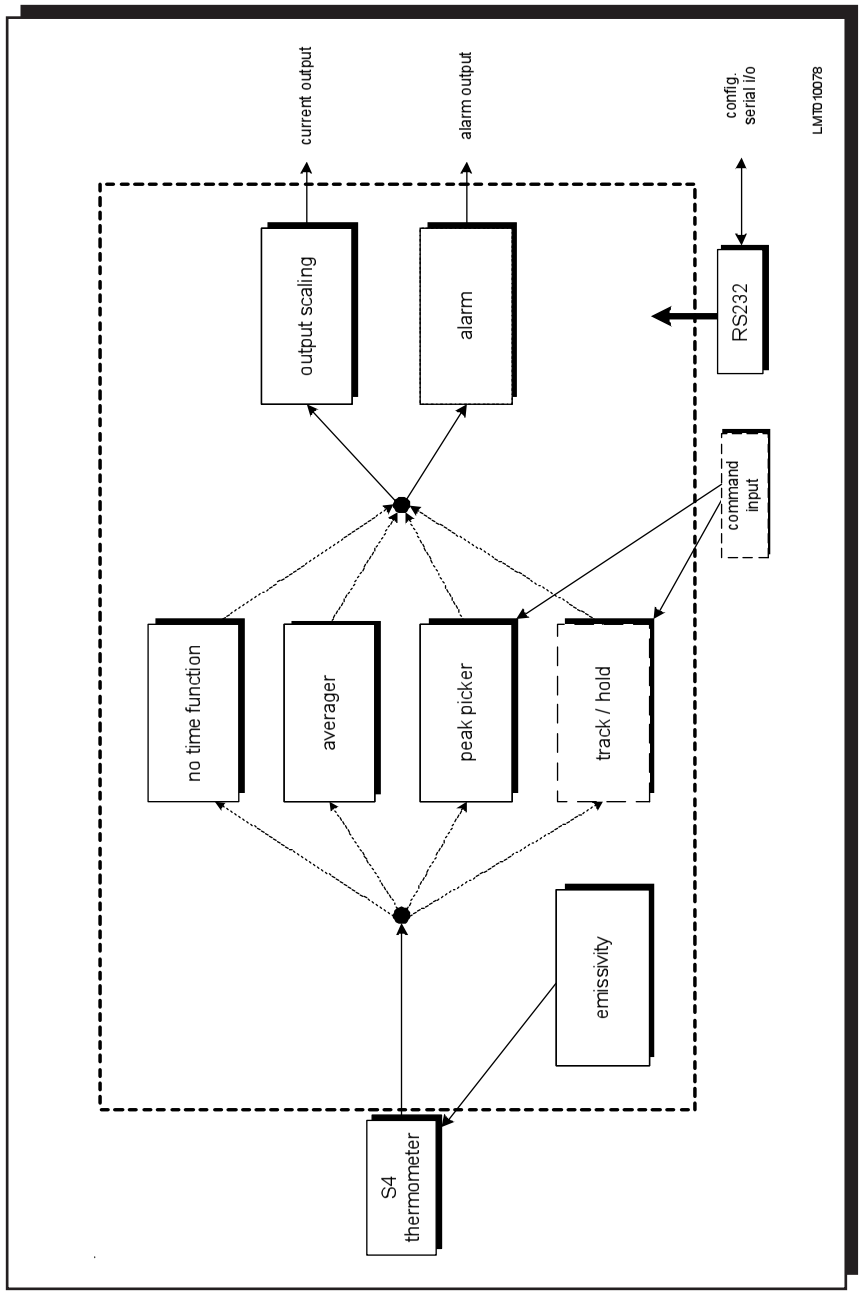

Fig. 2 LM Technic - Functional Block Diagram

2.0 SPECIFICATION

Input/output accuracy:	<0.1% of span
Input/output drift:	<0.1% of span/°C
Quantisation:	16 bit
Sampling:	10ms
Signal retransmission range:	Adjustable over thermometer span (min 100°)
Signal retransmission current:	0 to 20mA/4 to 20mA
Signal update rate:	10ms
Current output load inc. cable:	500 ohms
Emissivity setting:	0.200 to 1.000 in 0.001 steps
Non-greyness setting:	0.800 to 1.250 in 0.001 steps
Averager adjustment range:	50ms to 512s (63%) in 15 steps
Peak Picker decay range:	0.25°/s to 512°/s in 12 steps
threshold:	1° steps
on delay:	0 to 10s in 0.1s steps
off delay:	0 to 10s in 0.1s steps
reset mode:	Hold/reset
Track/Hold:	Controlled by external contact closure/5 to 24V d.c.
Track/Hold response time:	10ms
Alarm:	Hi/Lo
Trip level:	1° steps
Relay:	50V d.c. at 0.1A
Configuration:	Parameters set by configuration port**
Configuration port:	RS232 9600 baud fixed
PSU*:	30V to 50V d.c. at 300mA (including thermometer) 24V to 34V a.c. rms
Environment:	
Vibration:	1g any axis, 10 to 300 Hz
Humidity:	0 to 99% non condensing
Sealing:	IP20
Ambient:	5 to 50°C/41 to 122°F in specification
EMC:	EN61326

* LAND DPU recommended
** LAND Configuration software recommended

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3.0 INSTALLATION AND REMOVAL

3.1 Fitting the unit onto a DIN rail

The LM Technic processor is designed to be mounted onto a standard DIN rail. To install the unit:-

1) Ensure that a suitable DIN rail (DIN EN 50 022) is available and installed correctly (refer to Appendix).

2) Refer to Fig. 3. Rest the uppermost groove on the rear of the processor on the top lip of the DIN rail.

3) Push the bottom of the unit so that the sliding spring catch clips onto the DIN rail.

3.2 Removing the unit from a DIN rail

1) Refer to Fig. 4. Insert a screwdriver into the sliding spring catch via the slot on the underside of the unit.

2) Lever the sliding spring catch downwards so that it disengages from the DIN rail.

3) Lift the processor off the DIN rail.

3.3 Electrical connections

The LM Technic processor is designed to be used in conjunction with the Land DPU Power Supply Unit.

The LMT to DPU wiring interconnections are given in Fig. 5 (overleaf).

The LMT wiring schedule is given in Table 1 (Page 7).

The DPU wiring schedule is given in Table 2 (Page 7).

Connections to the configuration port are given in Table 3 - Appendix B (Page 22).

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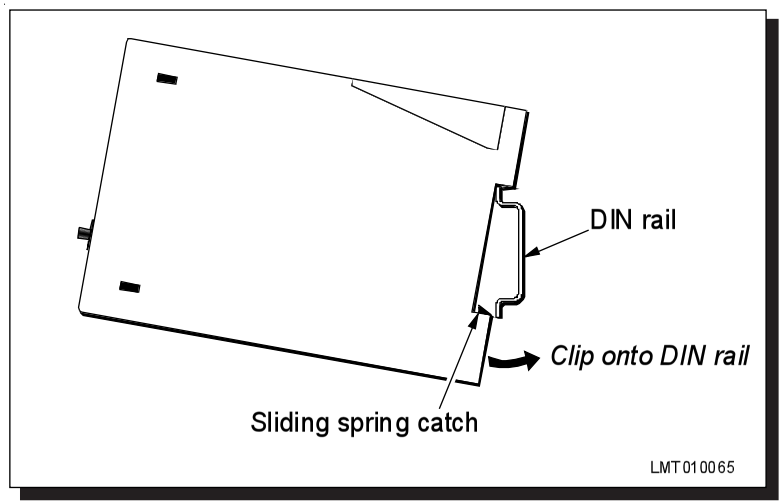


Fig. 3 Installing the LM Technic onto a DIN rail

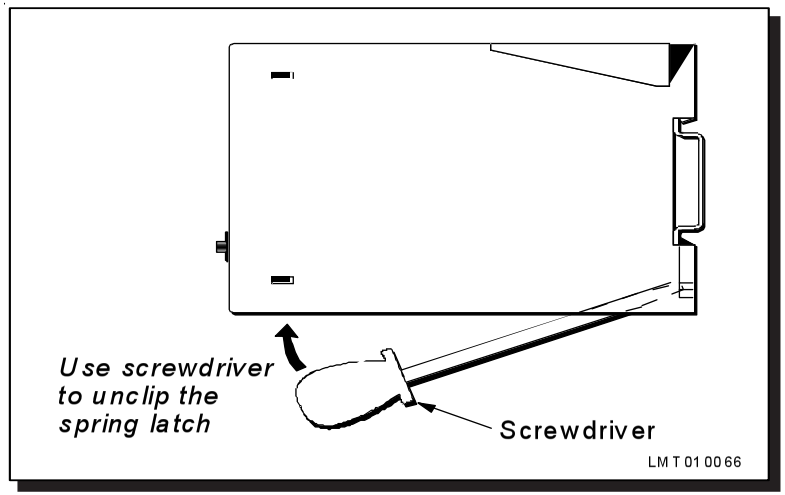
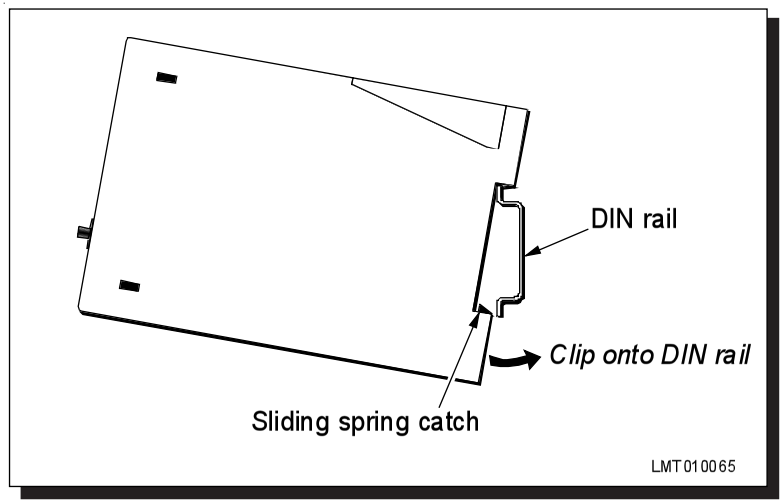


Fig. 4 Removing the LM Technic from a DIN rail

Landmark Technic User Guide



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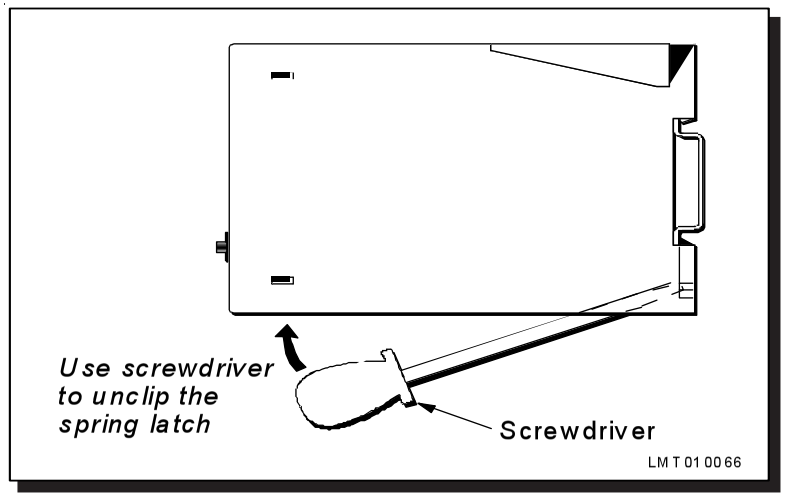

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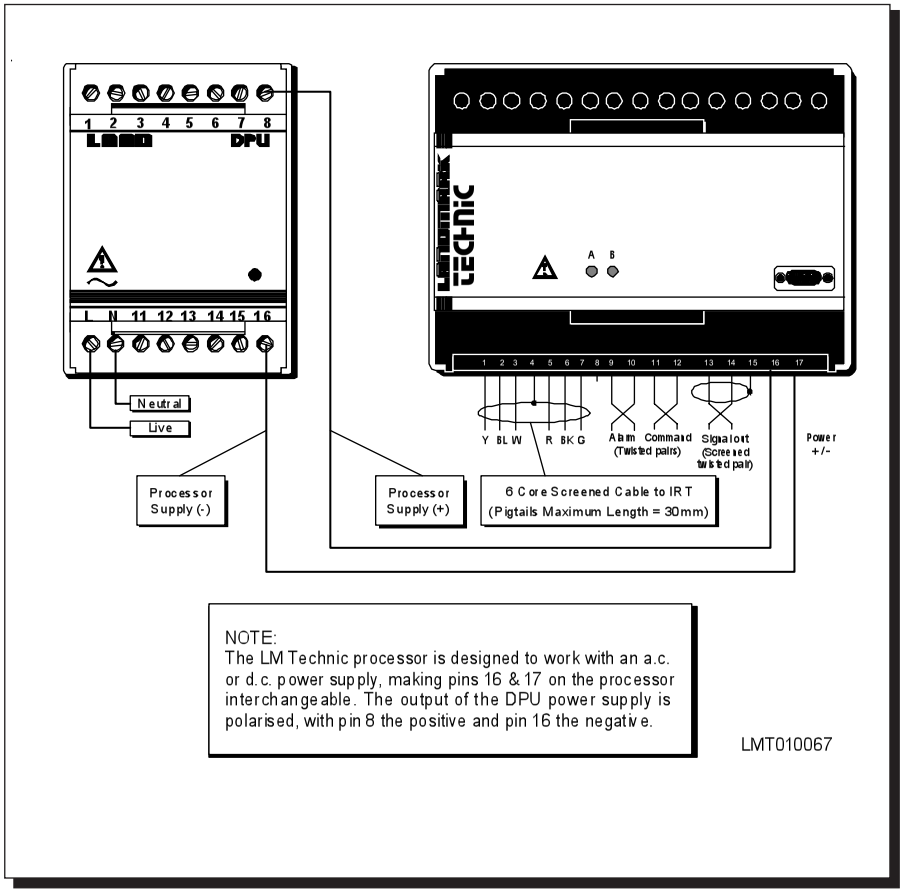
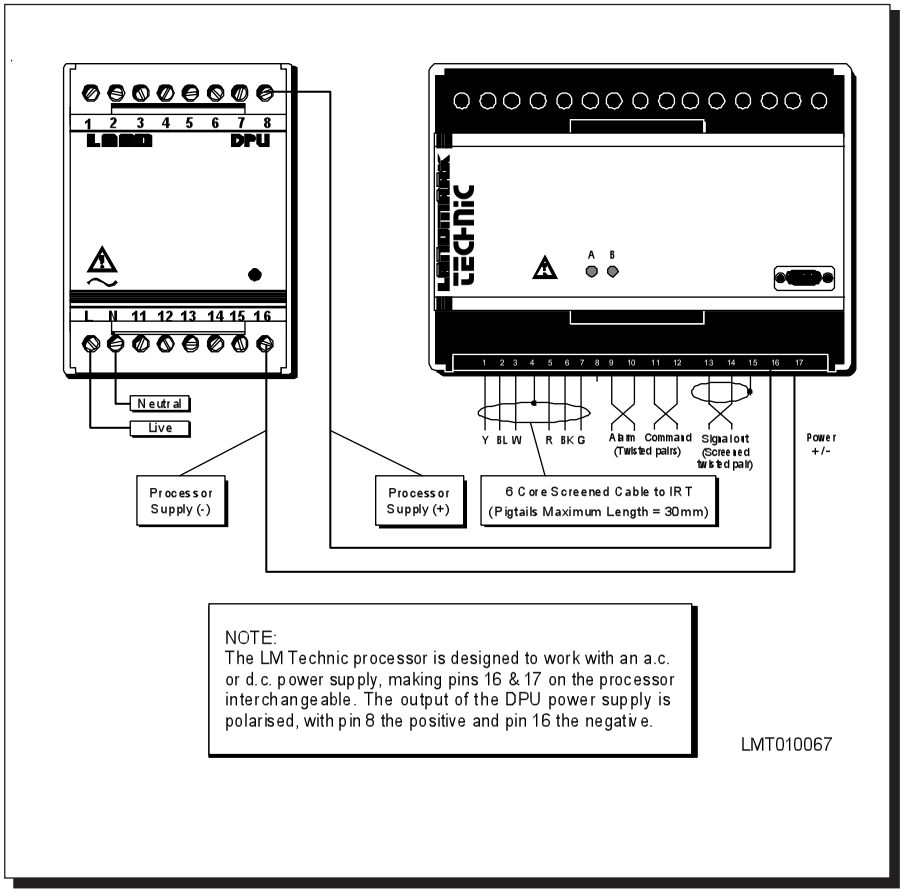

1 2 3 4 5 6 7 8
DPU
L N 11 12 13 14 15 16
A B
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Neutral
Live
Y BL W R BK G
Alarm (Twisted pairs)
Command
Signalcott (Screened twisted pair)
Power +/-
Processor Supply (-)
Processor Supply (+)
6 Core Screened Cable to IRT (Pigtails Maximum Length = 30mm)
NOTE:
The LM Technic processor is designed to work with an a.c. or d.c. power supply, making pins 16 & 17 on the processor interchangeable. The output of the DPU power supply is polarised, with pin 8 the positive and pin 16 the negative.
LMT010067

Fig. 5 LM Technic and DPU interconnections

User Guide Landmark Technic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3.3 Electrical connections (Continued.....)

LM Technic Terminal No.	Wire Colour	Function
1	Yellow	Signal input (+) from thermometer
2	Blue	Signal input (-) from thermometer
3	White	Emissivity output (+) to the thermometer
4	Screen	Thermometer cable screen
5	Red	Thermometer power supply (+)
6	Black	Thermometer power supply (-)
7	Green	Emissivity return (-)
8	●	Not applicable - do not use
9	●	Alarm Relay (1)
10	●	Alarm Relay (2)
11	●	Command (+)
12	●	Command (-)
13	●	Signal out (+)
14	●	Signal out (-)
15	●	Signal out (Screen)
16	●	Processor power supply input (1)
17	●	Processor power supply input (2)

Table 1 Landmark Technic terminal connections

DPU Terminal Nº	Function
L	Mains input live
N	Mains input neutral
8	DPU output (+)
16	DPU output (-)
***** All other DPU terminals are not used in this application *****	

Table 2 DPU Terminal Connections

Landmark Technic User Guide

3.3 Electrical connections (Continued.....)

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Table 2 DPU terminal connections

3.3.1 Alarm output connection schedule

The Alarm output connection schedule is given in Fig. 5 and Table 1.

The Alarm relay contact rating is 50V a.c. or d.c. at 0.1A.

It is recommended that a twisted pair connection be used.

3.3.2 CMD (Command) input connection schedule

The CMD (Command) input connection schedule is given in Fig. 5 and Table 1.

The command signal is inactive when the voltage is >3.0V or open circuit (i.e. Track).
The command signal is active when the voltage is <1.5V or short circuit (i.e. Hold).

The command input can be controlled via a remote switch, as shown in Fig. 6 or via potential-free contacts as shown in Fig. 7.

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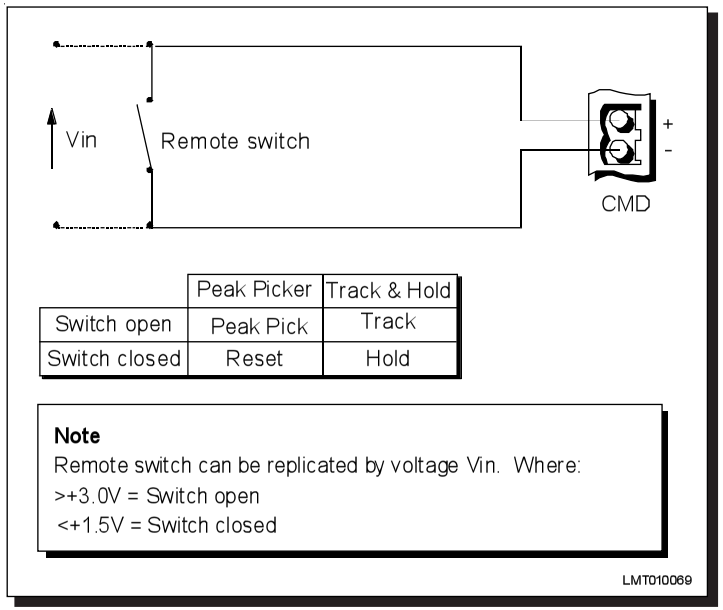
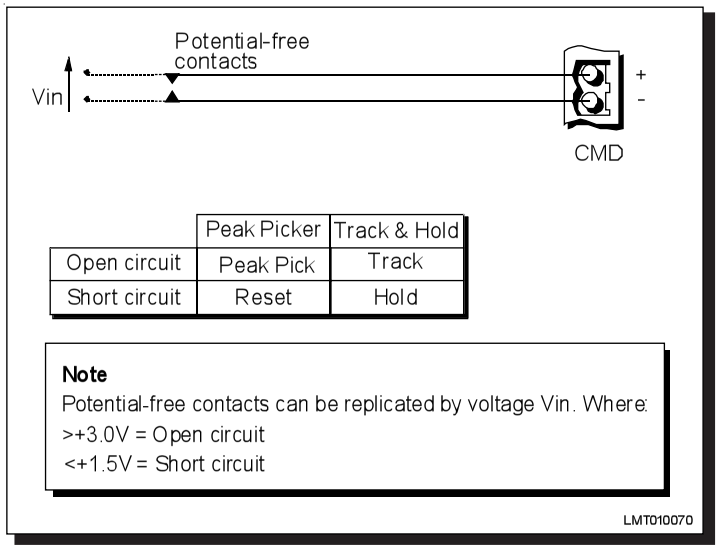


	Peak Picker	Track & Hold
Switch open	Peak Pick	Track
Switch closed	Reset	Hold

Note
Remote switch can be replicated by voltage Vin. Where:
>+3.0V = Switch open
<+1.5V = Switch closed

Fig. 6 'CMD' (command) input control via a remote switch



	Peak Picker	Track & Hold
Open circuit	Peak Pick	Track
Short circuit	Reset	Hold

Note
Potential-free contacts can be replicated by voltage Vin. Where:
>+3.0V = Open circuit
<+1.5V = Short circuit

Fig. 7 'CMD' (command) input control via potential-free contacts

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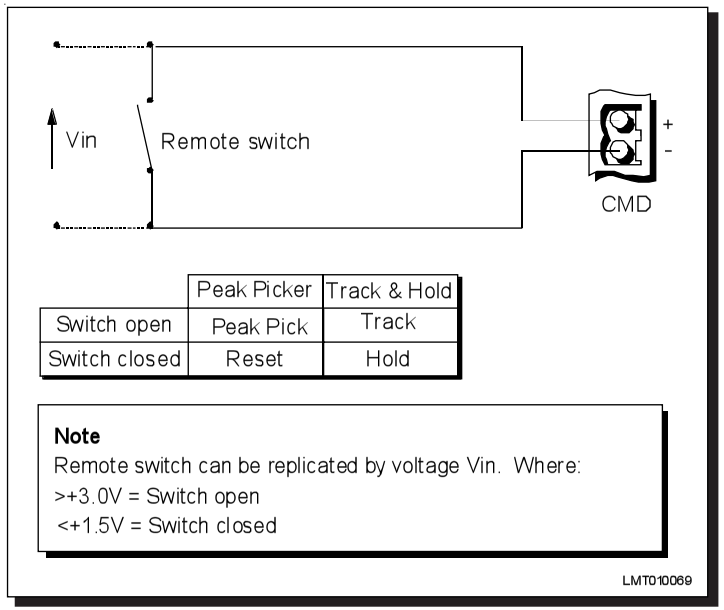

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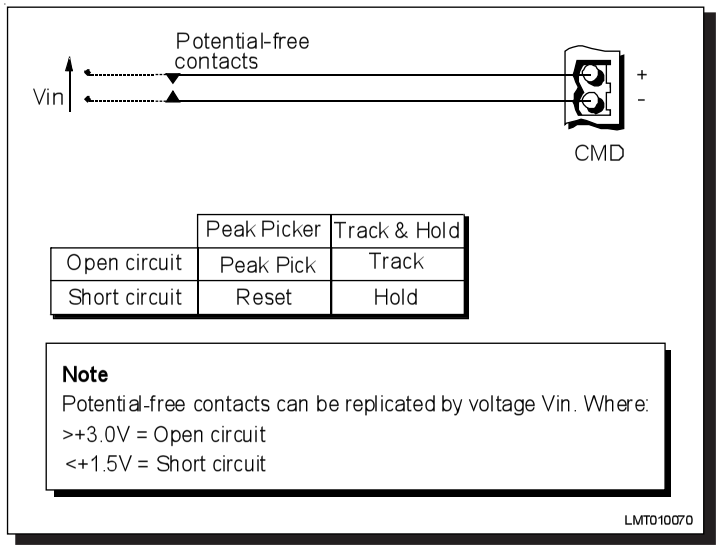

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3.3.3 Output (Retransmission output) connection schedule

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It is recommended that a screened twisted pair cable is used.

3.3.4 Thermometer output connection schedule

The thermometer output connection schedule is given in Fig. 5 and Table 1. It is recommended that 6-way screened cable is used.

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3.4 Cable connector assembly

The cable connectors for the processor are included in the processor package. Each cable connector must be correctly wired with the appropriate cable. (Refer to Section 3.3 for the cable schedules).

To wire up the connector.

1) Make a note of the connector's orientation.

2) Unclip the two halves of the connector shell to reveal the terminal block and the cable tie/clamp bar.

3) Wire up the connector, remembering the correct orientation of the plug, in accordance with the relevant cable schedule (see Section 3.3).

4) Ensure that the cable outer insulation is held in the clamp bar/cable tie at the connector and tighten the clamp bar screws/cable tie. Refer to Fig. 8.

5) Clip together the two halves of the connector shell ensuring that the 'write-on' label is held in place by the shell assembly.

The connector is now ready for use.

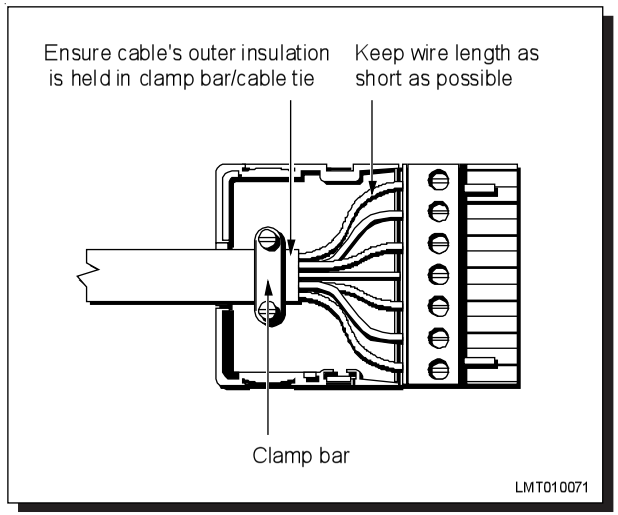

Fig. 8 Correct cable connector wiring arrangement

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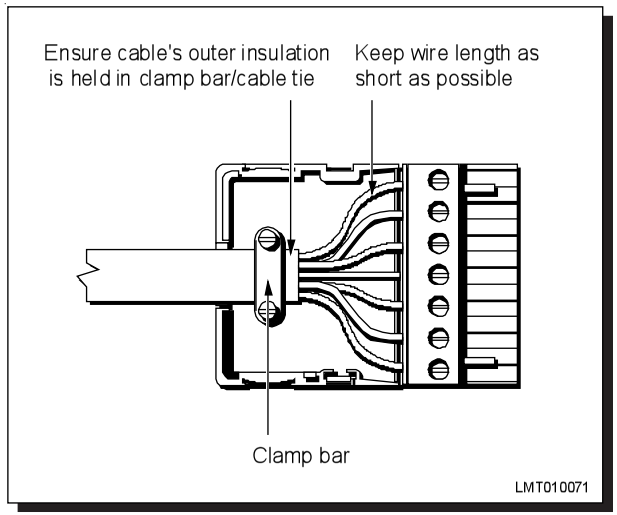

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4.0 USING THE CONFIGURATOR

When the processor is connected to a System 4 thermometer, the processor must be configured for use with that particular thermometer and have it's operating parameters set. The temperature measurement system (i.e. processor and thermometer) is most easily configured using the LM Technic Configuration Software and a suitable PC.

[It is also possible to use a PC running standard terminal software and an RS232 port to perform the configuration, allowing the individual commands to be used. See Appendix B]

Once configured, the PC can be disconnected and the LM Technic can be left to run alone, with configuration stored into it's non-volatile memory.

4.1 Installation

Run the file on the CD and follow the Installation Instructions.

4.2 Getting started

After the power supply has been connected (see Section 3) and switched on, it is possible to configure the LM Technic using the configuration software. Connect the configurator cable between the PC and the LM Technic and run the software by running the .exe file in the installation directory. The configurator software should respond with the display as shown below.

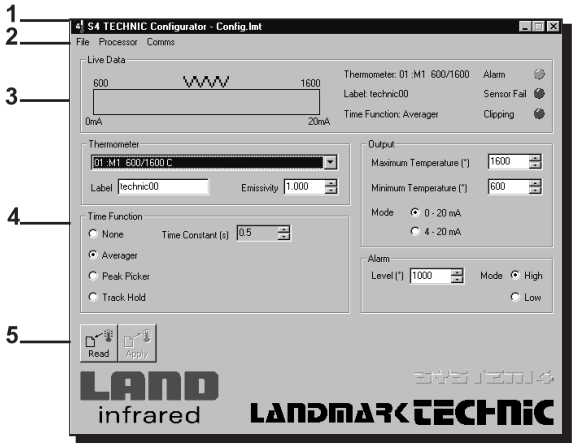

Fig. 9 Configurator Display

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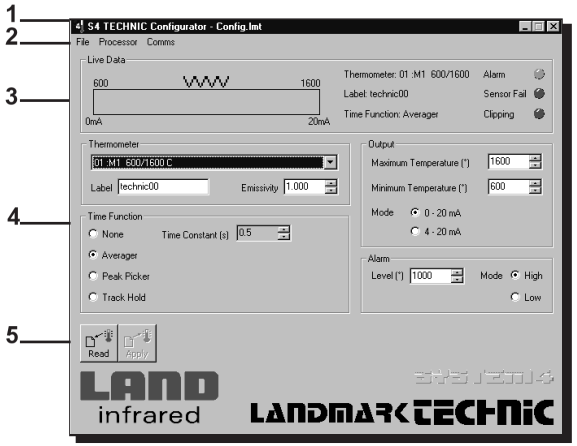

Fig. 9 Configurator Display

Configurator features key:

1 Title bar indicating configuration file name
2 A menu bar
3 A 'live' display showing actual configuration and process data from the connected processor
4 A 'configuration area' allowing parameters to be adjusted
5 Buttons for applying/reading the configuration to/from the processor

Configuration parameters can be stored to the LM Technic and/or can be downloaded to a file on the PC for later use. It is possible to use the software without an LM Technic, however, only file menus will be available.

4.2.1 Setting a new configuration in a processor

1) **New.** Use the 'File', 'New', menu to load default data into the configuration area.

2) **Thermometer**. In the configuration area, select the thermometer type from the list box to match the thermometer actually connected to the LM Technic.

Note:
It is important that this is done first because it sets defaults and parameter limits in the other boxes.

3) **Label**. Type in a label for the processor/thermometer (15 characters maximum).

4) **Emissivity/Non-Greyness**. The menu changes dependent upon the selected thermometer. If a single colour thermometer has been selected, enter the desired emissivity for the material being measured. If a 2-colour ratio thermometer has been selected, enter the non-greyness.

5) **Output**. The current loop output can be scaled to any temperature range within the range of the selected thermometer (minimum span 100°). Select the desired current output range.

6) **Alarm**. The alarm level can be selected for any temperature within the range of the thermometer. The alarm can be selected to trip above (High) or below (Low) this temperature.

Landmark Technic User Guide

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3) Label. Type in a label for the processor/thermometer (15 characters maximum).

4) Emissivity/Non-Greyness. The menu changes dependent upon the selected thermometer. If a single colour thermometer has been selected, enter the desired emissivity for the material being measured. If a 2-colour ratio thermometer has been selected, enter the non-greyness.

5) Output. The current loop output can be scaled to any temperature range within the range of the selected thermometer (minimum span 100°). Select the desired current output range.

6) Alarm. The alarm level can be selected for any temperature within the range of the thermometer. The alarm can be selected to trip above (High) or below (Low) this temperature.

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4.2.1 Setting a new configuration in a processor (Continued)

7) **Time function**. Select from the time function processing available as required. Depending on the time function selected, a further set of parameters may need to be chosen. (See Section 5 for details on time function processing).

8) **Apply**. When the required configuration parameters have been entered, press the 'Apply' button to send the configuration data to the LM Technic.

9) A summary of the data sent will appear in the live data, confirming that the data has been received by the LM Technic.

4.2.2 Editing a configuration in a processor

1) **Read**. Use the 'Read' button to load data from the connected processor into the configuration area.

2) In the configuration area, adjust parameters as described in 4.2.1.

3) **Apply**. When the required configuration parameters have been entered, press the 'Apply' button to send the configuration data to the LM Technic.

4) A summary of the data sent will appear in the live data, confirming that the data has been received by the LM Technic.

4.2.3 Saving/Opening a configuration file

1) **Save**. Use the 'File', 'Save' menu to save the data from the configuration area to a file.

2) **Open**. Use the 'File', 'Open' menu to load data from a file into the configuration area.

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4.2.1 Setting a new configuration in a processor (Continued)

7) **Time function**. Select from the time function processing available as required. Depending on the time function selected, a further set of parameters may need to be chosen. (See Section 5 for details on time function processing).

8) **Apply**. When the required configuration parameters have been entered, press the 'Apply' button to send the configuration data to the LM Technic.

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5.0 TIME FUNCTION PROCESSING

5.1 Peak Picker

The Peak Picker function can be used to monitor the highest temperature measured by the thermometer. This feature is useful especially for moving targets and/or where the target is obscured partially e.g. a steel slab on a rolling mill where parts of the surface are covered with scale. The 'clean' area will be at the higher (i.e. true) temperature. The Peak Picker used in Landmark Technic processors has the following features. Refer to Fig. 10.

Threshold level: Temperature above which the Peak Picker is active, used in conjunction with the 'ON' and 'OFF' delay.

ON delay: Time period between the temperature rising above the threshold level and the Peak Picker function switching on

OFF delay: Time period between the temperature falling below the threshold level and the Peak Picker function switching off.

Mode: In 'Hold' mode, at the end of the 'OFF' delay, the temperature output value is held constant until the temperature input next rises above the threshold level.

In 'Reset' mode, at the end of the 'OFF' delay, the temperature output signal falls to 'under-range' until the temperature input next rises above the threshold level. The Peak Picker can be 'Reset' at any time by using the CMD input. See 3.3.2

Decay rate: A user-adjustable value at which the stored temperature output signal decays.

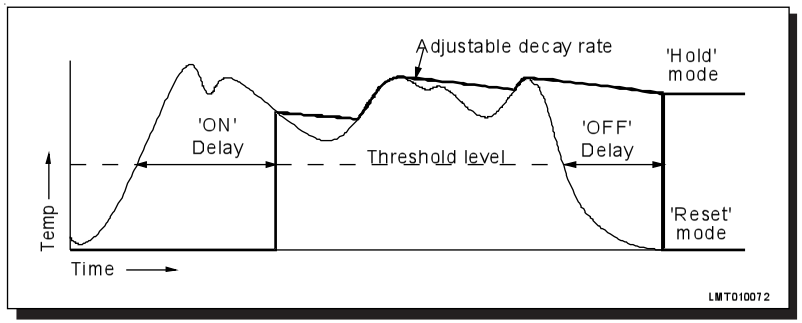

Fig. 10 Graphical representation of Peak Picker time function

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5.0 TIME FUNCTION PROCESSING

5.1 Peak Picker

The Peak Picker function can be used to monitor the highest temperature measured by the thermometer. This feature is useful especially for moving targets and/or where the target is obscured partially e.g. a steel slab on a rolling mill where parts of the surface are covered with scale. The 'clean' area will be at the higher (i.e. true) temperature. The Peak Picker used in Landmark Technic processors has the following features. Refer to Fig. 10.

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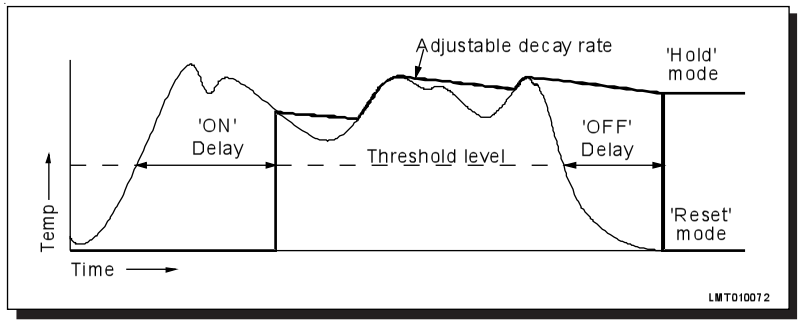

Fig. 10 Graphical representation of Peak Picker time function

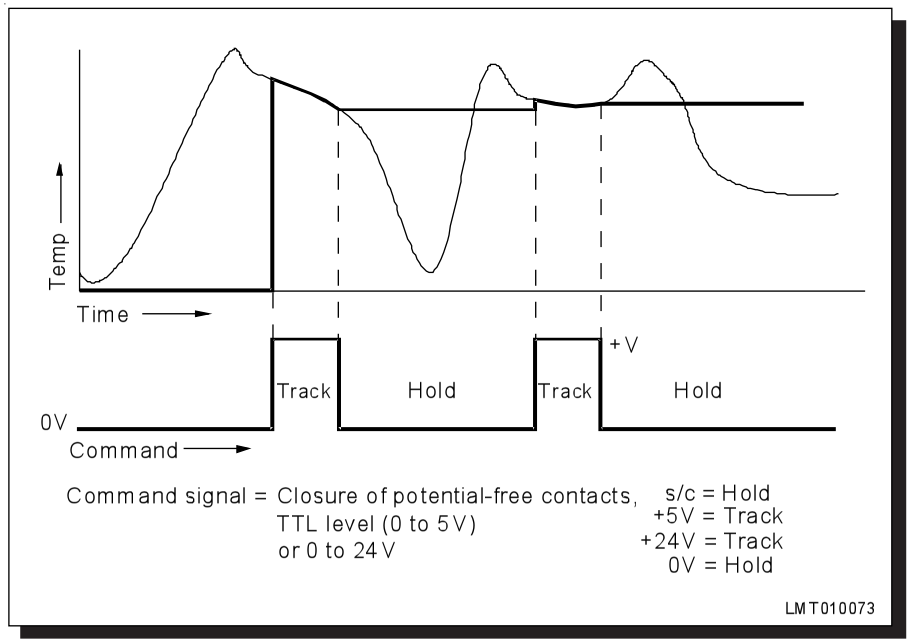

Fig. 11 Graphical representation of Track and Hold time function

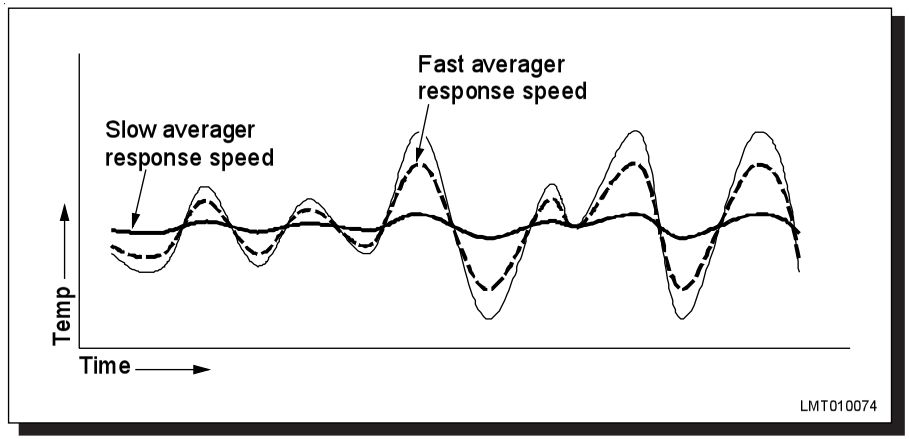

Fig. 12 Graphical representation of Averager time function

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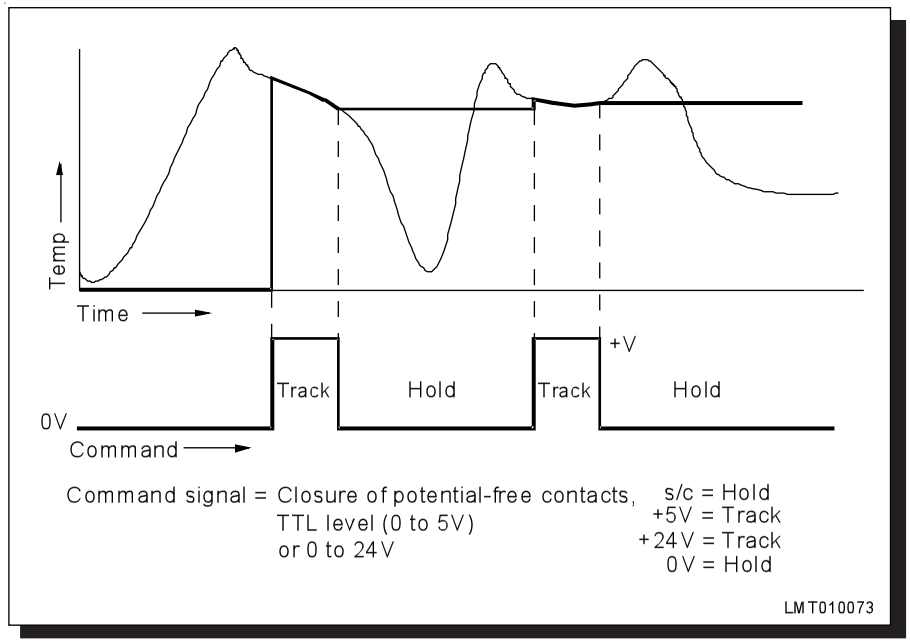

Fig. 11 Graphical representation of Track and Hold time function

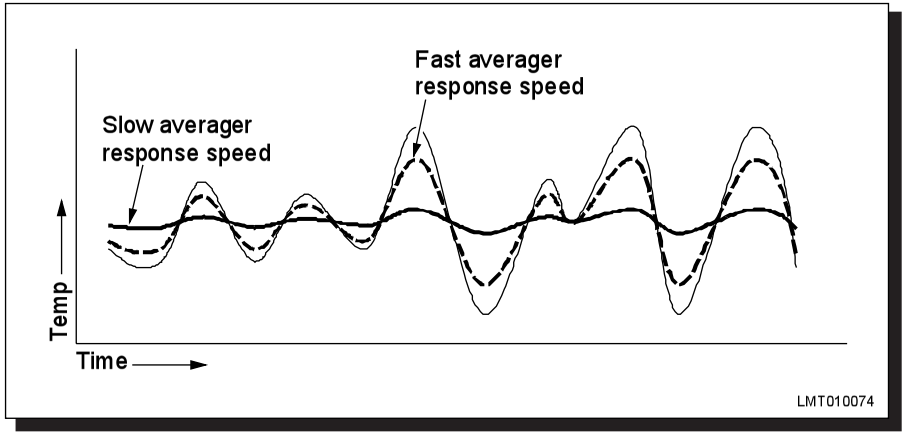

Fig. 12 Graphical representation of Averager time function

5.2 Track and Hold

Refer to Fig. 11. The Track and Hold time function is useful especially for measuring intermittent processes e.g. items on a conveyor belt. The presence of a 'hot' object can be used to activate the 'Track' function, which causes the output to display the temperature of the object. When the object moves from the measurement area, the 'Track' function can be switched off and the temperature value held until the next 'hot' object appears.

The Track and Hold function is controlled via the CMD (Command) input. See 3.3.2

5.3 Averager

Refer to Fig. 12. The Averager time function can be used to 'smooth' the temperature output signal in relation to the temperature input. The averager response can be adjusted to suit your application. With a fast response speed, the temperature output signal tracks the input signal closely, any rapid fluctuations in the input are reflected in the output. With a slow response speed, the temperature output signal is much smoother, displaying more the 'trend' of the input signal rather than rapid changes.

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5.2 Track and Hold

Refer to Fig. 11. The Track and Hold time function is useful especially for measuring intermittent processes e.g. items on a conveyor belt. The presence of a 'hot' object can be used to activate the 'Track' function, which causes the output to display the temperature of the object. When the object moves from the measurement area, the 'Track' function can be switched off and the temperature value held until the next 'hot' object appears.

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6.0 LED INDICATORS

LED's A and B on the Landmark Technic give visual identification of internal operations of the unit. The following table lists the indications in order of precedence.

LED A	
Colour	**Indication**
Amber	Test Mode
Flashing Amber	Volatile Configuration
Flashing Green	Configurator Connected
Green	OK
LED B	
Colour	**Indication**
Red	Sensor Fail***
Flashing Red	Alarm
Amber	Clipping*
Flashing Amber	Obscured**
Flashing Green	Command Input Active
Green	OK

* Clipping = Unstable Input To Averaging Function
** Unclamped Ratio Pyrometers only
*** Clamped Pyrometers Only

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6.0 LED INDICATORS

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Amber	Test Mode
Flashing Amber	Volatile Configuration
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Colour	**Indication**
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Flashing Red	Alarm
Amber	Clipping*
Flashing Amber	Obscured**
Flashing Green	Command Input Active
Green	OK

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** Unclamped Ratio Pyrometers only
*** Clamped Pyrometers Only

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7.0 MAINTENANCE

The Landmark Technic Processor is designed to be virtually maintenance free, but calibration checks are highly recommended at periods of not more than 1 year. For details on Landmark Technic calibration, please contact Land Infrared Calibration Services.

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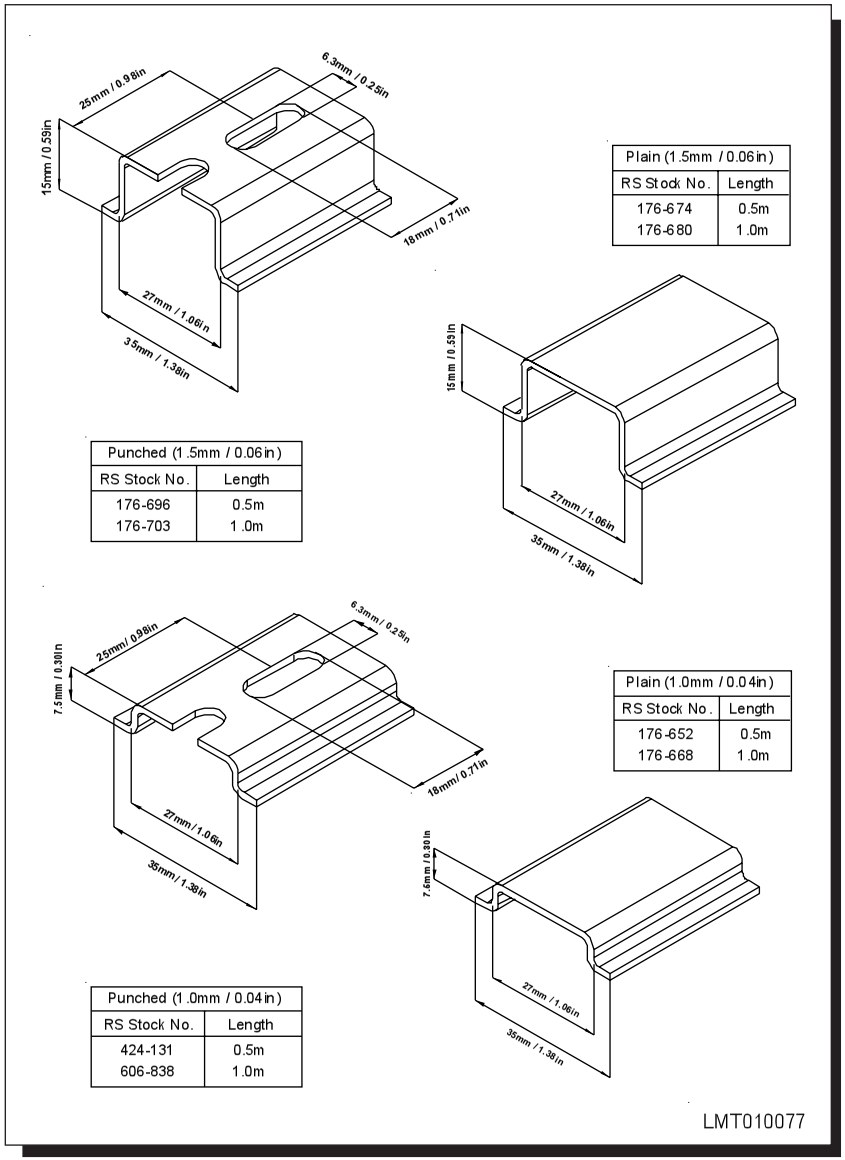
APPENDIX A - DIN RAIL SPECIFICATION

DIN rail specification. DIN EN 50 022



Plain (1.5mm / 0.06in)	
RS Stock No.	Length
176-674	0.5m
176-680	1.0m

Punched (1.5mm / 0.06in)	
RS Stock No.	Length
176-696	0.5m
176-703	1.0m

Plain (1.0mm / 0.04in)	
RS Stock No.	Length
176-652	0.5m
176-668	1.0m

Punched (1.0mm / 0.04in)	
RS Stock No.	Length
424-131	0.5m
606-838	1.0m

Fig. 9 DIN rail dimensions

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APPENDIX A - DIN RAIL SPECIFICATION

DIN rail specification. DIN EN 50 022

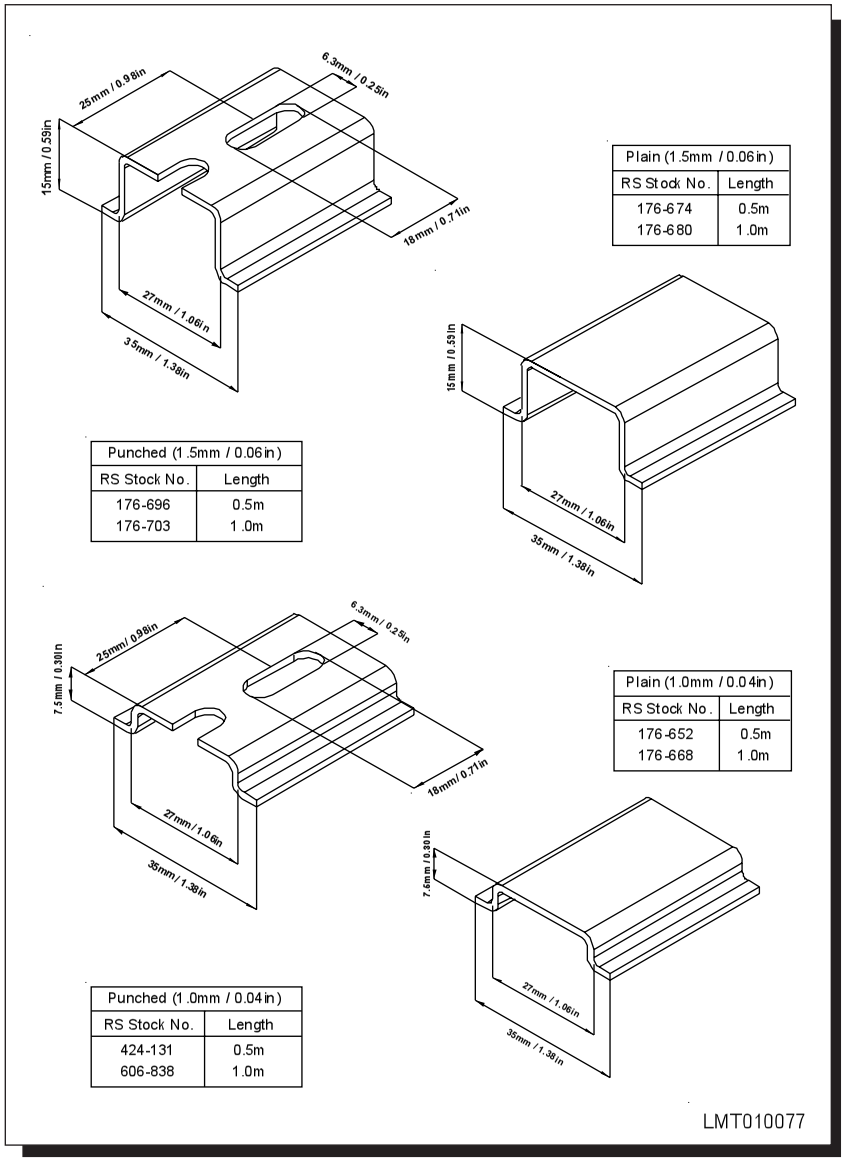

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Fig. 9 DIN rail dimensions

APPENDIX B - SERIAL COMMUNICATIONS SET-UP

The Landmark Technic configurator port can be used for communication between the processor and either a terminal or a computer.

NOTE
It is recommended that configuration is normally performed using the configuration software provided.

RS232C is standard and compatible with either terminals or computers which allows communications with a single processor only.

RS485 - contact Land Infrared.

Serial Communications specification

Mode selection: RS232C

Baud rate: 9600

Data bits: 8 bits

Parity: None

Stop bits: 1

The RS232 serial communications output connection schedules are given in Fig. 5 and Table 3.

Configurator Connector Pin #	Function	232 Cable (031.085)	
		Colour	D Type Pin #
1	0V	Black	5
2	232RX	Yellow	3
3	232TX	White	2
4	485(Y)	-	-
5	485(Z)	-	-
6	Do not use	-	-
7	Do not use	-	-
8	485(A)	-	-
9	485(B)	-	-

Table 3 Configurator terminal connections

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APPENDIX B - SERIAL COMMUNICATIONS SET-UP

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Mode selection: RS232C

Baud rate: 9600

Data bits: 8 bits

Parity: None

Stop bits: 1

The RS232 serial communications output connection schedules are given in Fig. 5 and Table 3.

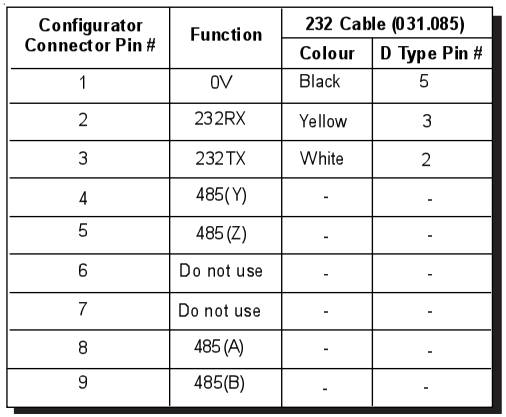

Table 3 Configurator terminal connections

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B1 Serial Communications protocol

B1.1 RS232C read data

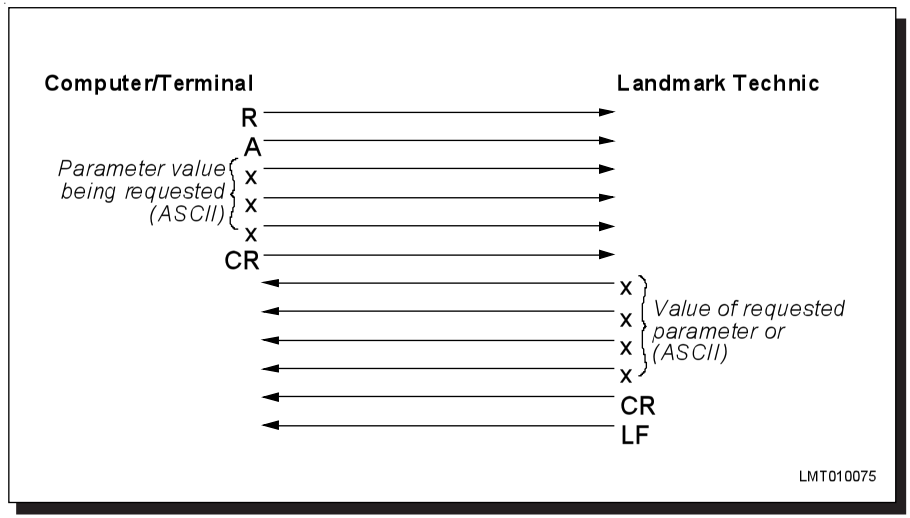

Fig. 13 RS232C mode *READ* protocol

B1.2 RS232C set data

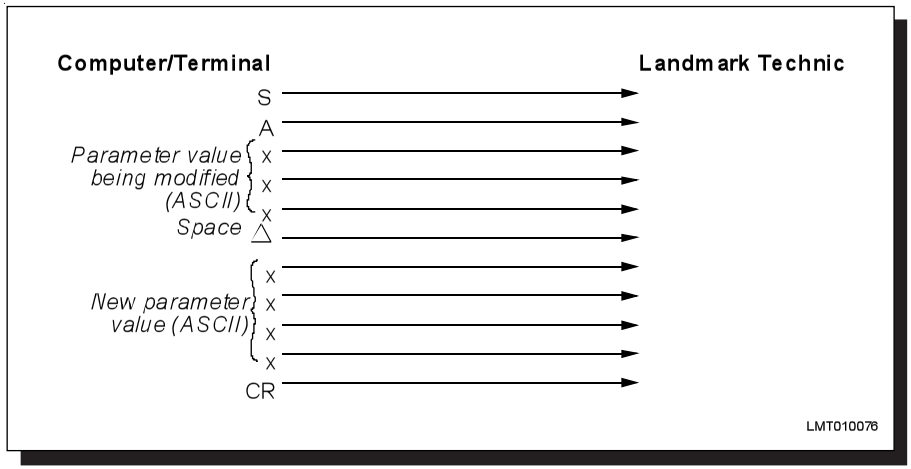

Fig. 14 RS232C mode *WRITE* protocol

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B1 Serial Communications protocol

B1.1 RS232C read data

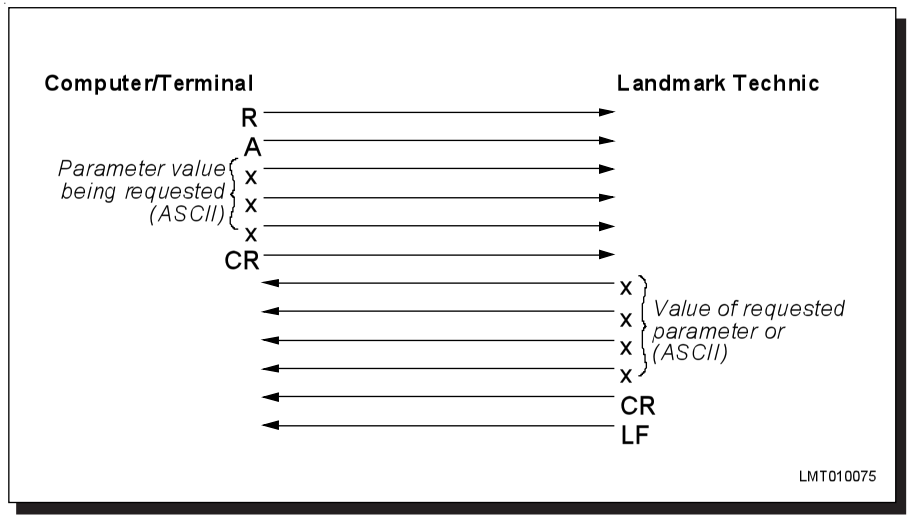

Fig. 13 RS232C mode *READ* protocol

B1.2 RS232C set data

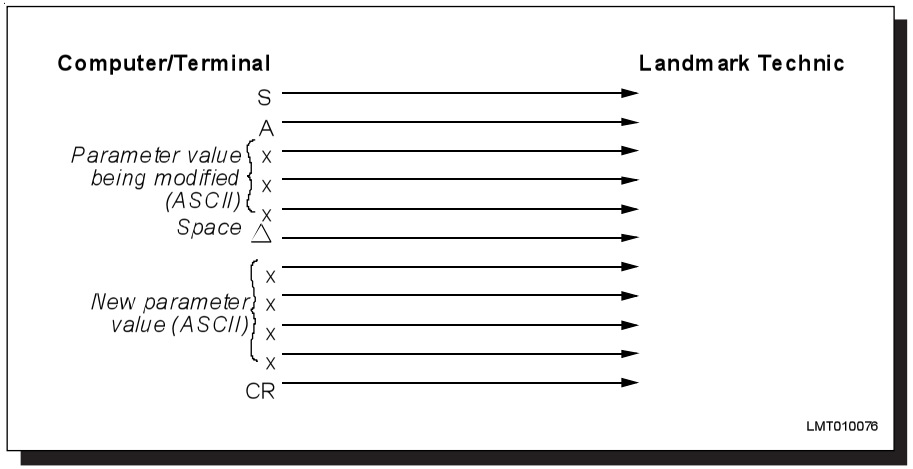

Fig. 14 RS232C mode *WRITE* protocol

B1.3 RS232C examples

To read the temperature

Type at the terminal: RATMP [enter]

Breakdown:		
	R	Read mode
	A	Always A
	TMP	Command to report the temperature
	[enter]	Press terminal enter key

Reply: 1000 Temperature in degrees

To set the emissivity to 0.500

Type at the terminal: SAEMS 500 [enter]

Breakdown:		
	S	Set mode
	A	Always A
	EMS	Command to work on the emissivity value
	∆	(Space)
	500	New value
	[enter]	Press terminal enter key

Reply: None

NOTE
In general, changed parameters are stored in volatile memory until an explicit save command is sent (see MEM in Section B1.4).

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B1.3 RS232C examples

To read the temperature

Type at the terminal: RATMP [enter]

Breakdown:
R Read mode
A Always A
TMP Command to report the temperature
[enter] Press terminal enter key

Reply: 1000 Temperature in degrees

To set the emissivity to 0.500

Type at the terminal: SAEMS 500 [enter]

Breakdown:
S Set mode
A Always A
EMS Command to work on the emissivity value
∆ (Space)
500 New value
[enter] Press terminal enter key

Reply: None

NOTE
In general, changed parameters are stored in volatile memory until an explicit save command is sent (see MEM in Section B1.4).

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B1.4 Serial Port Parameters

Name	Menu title text	Range		Increment	Default	Comments	
		Min	Max				
IRT	Thermometer type						List of available thermometers obtained using IFO command. Note Changing IRT sets default parameters in other places
EMS	Emissivity	200	1000	1	1000	e.g; 0.200 = 200	Use of correct parameter is determined by irt_type value.
NGR	Non greyness	800	1250	1	1000	e.g. 1.103 = 1103	
TFN	Time function	0	3	1	0	0 = None 1 = Averager 2 = Peak picker 3 = Track & hold	
PPM	Peak picker mode	0	1	1	0	0 = Reset 1 = Hold	
PPT	Peak picker threshold	irt_tmin	irt_tmax	1	irt_tmin	= value in degrees e.g. ; 1051C	Limits and units determined by irt_type value
PON	Peak picker ON delay	0	100	1	0	e.g. ; 69 = 6.9s	Seconds
POF	Peak picker OFF delay	0	100	1	100	e.g. ; 32 = 3.2s	Seconds
PPD	Peak Picker decay rate	0	15	1	0	0 = 0.00 1 = 0.25 2 = 0.5 3 = 1.0 4 = 2.0 5 = 4.0 6 = 8.0 7 = 16.0 8 = 32.0 9 = 64.0 10 = 128 11 = 256 12 = 512	Units are °/s 13 to 15 not used Initially set to 12
AVR	Averager response time	0	15	1	1	0 = 0.00 1 = 0.05 2 = 0.1 3 = 0.15 4 = 0.25 5 = 0.5 6 = 1.0 7 = 2.0 8 = 4.0 9 = 8.0 10 = 16.0 11 = 32.0 12 = 64.0 13 = 128 14 = 256 15 = 512	Units are s Initially set to 1

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B1.4 Serial Port Parameters

Name | Menu title text | Range Min | Range Max | Increment | Default | Comments | Comments
IRT | Thermometer type | | | | | | List of available thermometers obtained using IFO command. Note Changing IRT sets default parameters in other places
EMS | Emissivity | 200 | 1000 | 1 | 1000 | e.g; 0.200 = 200 | Use of correct parameter is determined by irt_type value.
NGR | Non greyness | 800 | 1250 | 1 | 1000 | e.g. 1.103 = 1103 |
TFN | Time function | 0 | 3 | 1 | 0 | 0 = None 1 = Averager 2 = Peak picker 3 = Track & hold |
PPM | Peak picker mode | 0 | 1 | 1 | 0 | 0 = Reset 1 = Hold |
PPT | Peak picker threshold | irt_tmin | irt_tmax | 1 | irt_tmin | = value in degrees e.g. ; 1051C | Limits and units determined by irt_type value
PON | Peak picker ON delay | 0 | 100 | 1 | 0 | e.g. ; 69 = 6.9s | Seconds
POF | Peak picker OFF delay | 0 | 100 | 1 | 100 | e.g. ; 32 = 3.2s | Seconds
PPD | Peak Picker decay rate | 0 | 15 | 1 | 0 | 0 = 0.00 1 = 0.25 2 = 0.5 3 = 1.0 4 = 2.0 5 = 4.0 6 = 8.0 7 = 16.0 8 = 32.0 9 = 64.0 10 = 128 11 = 256 12 = 512 | Units are °/s 13 to 15 not used Initially set to 12
AVR | Averager response time | 0 | 15 | 1 | 1 | 0 = 0.00 1 = 0.05 2 = 0.1 3 = 0.15 4 = 0.25 5 = 0.5 6 = 1.0 7 = 2.0 8 = 4.0 9 = 8.0 10 = 16.0 11 = 32.0 12 = 64.0 13 = 128 14 = 256 15 = 512 | Units are s Initially set to 1

B1.4 Serial Port Parameters (Continued)

Name	Menu title text	Range		Increment	Default	Comments	
		Min	Max				
A1M	Mode	0	1	1	1	0 = Low 1 = High	
A1L	Level	irt_min	irt_max	1	irt_max	value in degrees	
OPT	Signal output type	0	1	1	1	0 = 0 to 20mA 1 = 4 to 20mA	
OMX	Signal output Tmax (20mA)	> irt_tmin +100	< irt_tmax	5	irt_tmax	= value in degrees	Additional limit on value ensures (t_max - t_min) = >100°
OMN	Signal output Tmin (mA)	> irt_tmin	< irt_tmax -100	5	irt_tmin	= value in degrees	
LBL	Channel label	Full charact-er set		1	LM Technic	= character string (15 characters long)	
A1S	Alarm 1 status					Read only	0 = not set 1 = set
OBS	Obscuration status					Read only	0 = not set 1 = set
OVR	Over range status					Read only	0 = not set 1 = set
TMP	Temperature reading					Read only	Temperature in degrees + unitsvdr
UDR	Under range status					Read only	0 = not set 1 - set

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B1.4 Serial Port Parameters (Continued)

Name	Menu title text	Range		Increment	Default	Comments	
		Min	Max				
A1M	Mode	0	1	1	1	0 = Low 1 = High	
A1L	Level	irt_min	irt_max	1	irt_max	value in degrees	
OPT	Signal output type	0	1	1	1	0 = 0 to 20mA 1 = 4 to 20mA	
OMX	Signal output Tmax (20mA)	> irt_tmin +100	< irt_tmax	5	irt_tmax	= value in degrees	Additional limit on value ensures (t_max - t_min) = >100°
OMN	Signal output Tmin (mA)	> irt_tmin	< irt_tmax -100	5	irt_tmin	= value in degrees	
LBL	Channel label	Full charact-er set		1	LM Technic	= character string (15 characters long)	
A1S	Alarm 1 status					Read only	0 = not set 1 = set
OBS	Obscuration status					Read only	0 = not set 1 = set
OVR	Over range status					Read only	0 = not set 1 = set
TMP	Temperature reading					Read only	Temperature in degrees + unitsvdr
UDR	Under range status					Read only	0 = not set 1 - set

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B1.4 Serial Port Parameters (Continued)

Name	Menu title text	Range Min	Range Max	Increment	Default	Comments	Bit	Function	Set	
FLG	Status flags	0x0000	0xFFFF	0x0001		Read Only	0	X		
							1	X		
							2	X		
							3	Command I/P	Active	Not active
							4	Under range	Active	OK
							5	Over range	Active	OK
							6	Obscured *	Active	OK
							7	Clipping **	Active	OK
							8	Sensor fail ***	Active	OK
							9	Alarm 1	Active	OK
							10	X		
							11	X		
							12	X		
							13	X		
							14	X		
							15	X		
							*	Unclamped Ratio IRT Only		
							**	Average Mode Only		
							***	Clamped IRT Only		
MEM	Memory function	0000	9999	0001	0000		Read response 0000 RAM= FLASH Read response 0001 RAM≠ FLASH Flag is set when configuration is volatile i.e. will be lost at power down Set arg 1101 Save RAM> FLASH Set arg 9999 Move FLASH> RAM See also REFresh			
REF	Refresh	0000	0001	0001		Read Only	0 = refresh ON, 1=refresh OFF continuous refresh FLASH to RAM			
IFO	Information	0	3	1		Read Only	0 = processor build info 1 = thermometer list 2 = configuration report 3 = contact information multi line reply with [start] and [end] delimitters			

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B1.4 Serial Port Parameters (Continued)

Name	Menu title text	Range Min	Range Max	Increment	Default	Comments	Bit	Function	Set	
FLG	Status flags	0x0000	0xFFFF	0x0001		Read Only	0	X		
							1	X		
							2	X		
							3	Command I/P	Active	Not active
							4	Under range	Active	OK
							5	Over range	Active	OK
							6	Obscured *	Active	OK
							7	Clipping **	Active	OK
							8	Sensor fail ***	Active	OK
							9	Alarm 1	Active	OK
							10	X		
							11	X		
							12	X		
							13	X		
							14	X		
							15	X		
							*	Unclamped Ratio IRT Only		
							**	Average Mode Only		
							***	Clamped IRT Only		
MEM	Memory function	0000	9999	0001	0000		Read response 0000 RAM= FLASH Read response 0001 RAM≠ FLASH Flag is set when configuration is volatile i.e. will be lost at power down Set arg 1101 Save RAM> FLASH Set arg 9999 Move FLASH> RAM See also REFresh			
REF	Refresh	0000	0001	0001		Read Only	0 = refresh ON, 1=refresh OFF continuous refresh FLASH to RAM			
IFO	Information	0	3	1		Read Only	0 = processor build info 1 = thermometer list 2 = configuration report 3 = contact information multi line reply with [start] and [end] delimitters			

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B1.5 System Communications Timing Data

Command response time

This is the time taken between the end of the last character of a command and the beginning of the first character of the reply. This time is independent of the selected baud rate.

All commands are serviced within 20ms.

Command reply time

This is the time taken by the LM Technic reply. It is directly related to the selected baud rate and the number of characters in the reply.

NOTE
Use of the IFO command, which will involve long replies, will disrupt internal timing and affect time function processing.

Inter-command timing

This is the time between the end of the last character of a command received by the LM Technic and the end of the last character of its response i.e. the period when the LM Technic is unable to take a command because it is still processing a previous one.

This is the command response time + command reply time.

For RS232C at 9600 baud, assuming a reply of 20 characters maximum, the inter-command time is 41ms.

Cable Lengths

The maximum cable lengths are, to a great extent, dependent on baud rate and cable type. Generally a lower baud rate will give reliable communications over a longer length of a given cable type.

RS232C 9600 baud, 50m (EIA RS232C standard)

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The Quality Management System of Land Instruments International Ltd. is approved to BS EN ISO9001:2000 for the design and manufacture, stockholding, in-house repair and site servicing of non contact temperature measuring instrumentation. Associated software designed and developed in accordance with TickIT.

Calibration certificates are available from our UKAS accredited Calibration Laboratory No. 0034. The Land calibration laboratory complies with the requirements of the international standard BS EN ISO/IEC 17025.

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Quality Assurance SYSTEM4

SAFETY INFORMATION

Symbol	Publication	Description
	IEC 417, No. 5031	Direct current
	IEC 417, No. 5032	Alternating current
	IEC 417, No. 5033	Both direct and alternating current
	IEC 617-2, No. 02-02-06	Three-phase alternating current
	IEC 417, No. 5017	Earth (ground) terminal
	IEC 417, No. 5019	Protective conductor terminal
	IEC 417, No. 5020	Frame or chassis terminal
	IEC 417, No. 5021	Equipotentiality
	IEC 417, No. 5007	On (Supply)
	IEC 417, No. 5008	Off (Supply)
	IEC 417, No. 5172	Equipment protected throughout by double insulation or reinforced insulation (equivalent to Class II of IEC 536)

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SYSTEM4 *Safety Information*

SAFETY INFORMATION (Continued)

Symbol	Publication	Description
	ISO 3864, No. B.3.6	Caution, risk of electric shock
	ISO 3864, No. B.3.1	Caution
	BS EN 100015	Observe precautions for handling electrostatic discharge sensitive devices
	BS EN 60825-1, 1994	Warning, laser radiation
		Refer to the Operating Instructions.

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